The sanitary systems, if any, vary throughout the large towns of the Hadhramaut. There are no drainage or sewerage systems in Mukalla. The houses for the most part are equipped with pit-latrines cleared every six months or a year. Waste water runs out from gullies projecting from the walls of the houses. At the time of my first visit there were 25 sweepers in charge of a *muqaddam* who were said to work from early morning till noon, and from two till six, but, apart from the main market street, there appeared to be little evidence of their activities. Since that time the number has been slightly increased, and, under the doctor's superintendence, the streets are somewhat cleaner.

In Shihr the waste water is allowed to settle into pools. As a consequence mosquitoes are a serious pest, but there is said to be little fever. There were no anopheles amongst specimens I captured. In Shibam there is a system of narrow gutters running down the middle of the streets. These become congested with rubbish and are rarely cleaned out, but when they are the refuse is sold.

Water Supply.

The water supply of Mukalla is brought from a reservoir at Baqrein, about four miles distant. The source is a mile further away at Bakezebur where there is a long series of deep wells, mostly protected by a stone coping but with no covering. These wells were constructed by labourers brought from Gheil ba Wazir where there are men " who know how to make waterworks ". The wells are connected at the bottom by a subterranean passage, used by those who clean the channel, along which the water flows till it emerges into an open cement channel leading to the reservoir at Baqrein. This reservoir is divided into compartments and the water passes through them into a delivery pipe. The outfall to the delivery pipe is partially protected from debris by a wire trap, and just outside the reservoir there is a covered manhole. There is no filter system and for the greater part of its length the supply is entirely unprotected, but the water is clear and apparently clean. It is conducted in pipes to the side of the mountain, along which it runs in a covered masonry channel, except where it is carried across gaps in pipes supported by piles. In the town there are reservoirs fitted with taps from which the water carriers draw their supply. Water supply is only laid on to the palaces and a few mosques.

The work was planned and begun by Sultan 'Awadh as a *Waqf* and was completed by Sultan 'Umar. It reflects great credit on the Mukalla administration, and if some protective measures were adopted would be, I should imagine, an unimpeachable supply. It is fortunate that cholera and typhoid are apparently unknown in Mukalla as it would be extraordinarily easy to contaminate the supply which, as I say, is unprotected, unfiltered, and not chlorinated.

There are several wells in Mukalla in which the water is brackish. The palaces, the Wazir's house, and the guest-house are fitted with

18:Ingrams G-3 (1934-36)1938 MM2 Hadhramaut MM2

in which tribesmen will not willingly engage, and as they are so conservative it will be long before they forsake their ancient occupation (or lack of occupation) and adjust themselves to fresh possibilities.

In the Hadhramaut however if the main producing area is to be the main wadi system, there is there a population which is already largely agriculturally minded. Shibam is chiefly a commercial centre, the principal market of the interior, but outside Shibam and throughout the other towns of the wadi the atmosphere is rural and people are largely land owners or workers on the land. In addition the tribes have become settled and it is interesting to note that most of them have settled in *badu* sections. Those tribes living in the great wadi are settled, but they have relations in the barren areas who are Badawin. If it becomes possible not only to make the country more self-supporting as regards its own food supplies, but also to produce something for export, it will benefit not only the growers but also the Badawin living between the coast and the wadi, for at present they have to take their camels back to the coast unloaded, since the Hadhramaut only consumes. Recently we forwarded samples of cotton and castor oil seed, which grow practically wild in the Hadhramaut without irrigation, to the Imperial Institute for examination and the reports were most favourable. This is not to say, of course, that their cultivation can be profitably undertaken without much further investigation and some experiments, but they are two possible lines of development, and now that an Agricultural Officer is being appointed new crops for systematic cultivation may be found. Water is of course the chief need, but that also we hope to investigate and there is every indication that there should be plenty of it in the areas most fit for agricultural development.

Mukalla is the political and commercial capital of the whole country. Here the Qu'aiti Sultan lives, and it is the headquarters of the Mukalla Government, and my own headquarters as Resident Adviser to His Highness and as the officer responsible to the Governor of the Aden Protectorate for political relations with the five easternmost Sultanates of the Protectorate. Mukalla is the one place that most of the several hundreds of visitors have seen. It is the most important port on the south coast of Arabia between Aden and Muscat, but somehow does not yet seem to have left the category of places which travellers take for granted, perhaps because until my wife and I took up our abode there had never been permanent European residents. In the last few months the European residents have risen to six, and though the place looks very much the same to us as it has always done, visitors say it is changing. A ship's captain who landed a short time ago asked in the bazaar how it was that port facilities had improved and how it was that the town looked cleaner. I believe the most enduring memory of Mukalla to people who have landed has been the stupendous fly population and the smells of dried fish and other even less pleasant substances. I would not go so far as to say that the flies and the smells have disappeared, but a recently trained local sanitary inspector with a corps of sweepers and sanitary dustbins have made some difference.

The climate of Mukalla is on the whole pleasant enough, and with the gradual cleaning up of the town healthy enough. Steps are now being taken to cope with the mosquito nuisance, for last year we had a particularly bad

18:Ingrams G-3 (1934-36)1938 MM2 Hadhramaut MM2

epidemic of malaria, the sequel to the heaviest rains the country had had, according to the old inhabitants, for twenty-two years. It was astonishing to see after a few hours of heavy rain how much damage had been done, for rocks and debris were washed down from the cliff behind the town and the main bazaar street cut across in many places by torrents.

Like every seaport Mukalla is thoroughly cosmopolitan and you find in its bazaars representatives of Arabs from all the coastal parts of South Arabia and the Red Sea and Persian Gulf, as well as Somalis and other Africans. One curious strain of not infrequent visitors are long-bearded Mongolian pilgrims who flourish incomprehensible Chinese passports at me and, speaking no Arabic or other language which can be understood locally, apparently desire onward travel facilities. There are quite a number of Indian visitors and residents too, including Banian shopkeepers, and in the upper layer of Mukalla society the various races, Indian and Arab, mix quite happily. We all attend each other's parties and the Government servants of Mukalla have started a very good club. Amongst the various festive occasions of the last year or so none was greater of course than the Coronation celebrations. The streets and house-tops were gay with flags and I can remember no more beautiful sight than the illuminations at night. The Palace, the Residency, the Government offices and the principal mosques were outlined in coloured lights, and I should think Mukalla that night burnt almost as much incense as Pliny complains of Nero burning at the funeral of Poppaea. Almost every house that had not coloured lights heaped incense in piles along its roof parapets and the coloured lights and the flaming incense were wonderfully reflected on the waters of the harbour, while clouds of smoke filled the streets with a sweet-scented fog and completely obliterated the smell of the fish. Now of course Mukalla is every night reflected in the water, for electric light has been introduced and the greenish glow of the new street lights is visible far away. At the Sultan's request steps are being taken to reorganize and train his forces and to raise and train forces for the Kathiri Sultan, and thanks to Captain Hopkins who has been in Mukalla for nearly six months the standard is already much higher than formerly.

After four until sunset Mukalla walks abroad, sitting either in the cafés on the water front or wandering out through the western gate and sitting in groups above the camel park and the road which leads to the interior. This is the familiar road which has been trodden and described by most of the older generation of travellers, but I suppose that few Europeans in future are likely to follow it on camel or donkey as we did on our first visit three years ago, for I hope it will not be long before the new motor road is finished. The 20 miles or so which are now completed are really a remarkable achievement, for the road is a mountain road, skilfully built up with stone along the hill-sides and well above the torrent beds. The line was followed and mapped by Captain L. G. Beach, R.E., who in a short visit also fixed the latitude and longitude of Shibam and Tarim, but there has been no expert supervision and the builders, all men from Mukalla, have shown themselves extra-ordinarily skilful.

Nowadays most travellers for the interior go by car, either along the beach to Shihr or, if the beach is not open, along the inland road which

ADEN MM1
HADHRAMAUT MM2

mosques and to storage tanks from which the commercial carriers draw water for sale to the inhabitants. Most well supplies are unprotected and exposed to subsoil and surface contamination. The ablution pools in the mosques are often heavily polluted and serve as vehicles for the transmission of intestinal infections. They also provide conditions favorable for the breeding of anopheline and other mosquitoes; also of Planorbis and Bulinus snails.

There are numerous small irrigation projects in the agricultural districts, especially in Western Aden Protectorate and the Hadhramaut, many of which have been in use for decades. They depend upon water from streams or wells and, in some parts of the highlands, from spring-fed cisterns. Pumps have been introduced in the modern developments, but in most instances water is drawn from streams and wells in the traditional manner, namely, in leather buckets by means of ropes pulled over wooden pulleys by men or animals.

Waste Disposal

The methods of sewage disposal are primitive. Septic tanks, which discharge into the main drainage system, are connected with some of the newer houses in Aden Colony, but pail privies provide the usual means of sewage disposal in both Aden and Sheikh Othman townships. In old buildings with several stories, soil pipes which may be 40 feet in length lead from the privies on the upper floors to containers below. The night soil is collected regularly from private and public latrines by the town authorities and conveyed to incineration plants. Pit latrines are employed in some quarters, but they are being abolished wherever possible. In the congested districts, the latrines are located along concrete passages between the rears of the houses and are drained to storm sewers or to soakpits. The construction of a modern sewerage system for the Colony is under consideration.

The "long drop" method, in which [illegible]

p. 244 (B)

shafts lead from lavatories in the upper stories to a reception chamber on the ground floor, is widely used in the larger houses in Western Aden Protectorate and the Hadhramaut. Pit or surface privies are sometimes found in the courtyards of the smaller houses, but the majority have no facilities for the disposal of sewage wastes. Indiscriminate pollution of the soil is a general practice.

Fauna and Flora

Few entomologic surveys have been made in this region, and data regarding the insect vectors and animal hosts of human disease are fragmentary. It is probable, however, that the species identified in the neighboring territories are present in Aden Protectorate under similar physiogeographic conditions.

Arthropoda. Mosquitoes. *Anopheles adenensis* (— *A. culicifacies adenensis*) is the most important anopheline mosquito in Aden Colony. Although it has been eradicated from Aden and Sheikh Othman townships, it persists in near-by oases, and is a major vector of malaria wherever it is encountered. In the last local outbreak in the *kutcha* hut district of Sheikh Othman, *A. adenensis* was found breeding in large numbers in the soakpits. It normally breeds in wells, shallow cisterns, irrigation canals and sluggish streams, and, before the institution of effective control measures, had become adapted to the high salinity of the saltpan seepages.

A. gambiae is widely distributed in the Protectorate, where it probably acts as the principal vector of malaria. It breeds along the edges of pools and streams, in irrigation canals, in wells and in numerous other collections of water. *A. turkhudi*, *A. coustani*, *A. d'thali*, *A. pretoriensis* and *A. barbirostris* have also been reported from various localities.

Aedes aegypti, the usual urban vector of yellow fever elsewhere, and *A. vittatus*, a tree-hole breeder implicated in the transmission of yellow fever in endemic foci in

ADEN MMI
HADHRAMAUT MM2

H 744 Responsibility for the health of the people in the Colony resides in its Medical and Health Department, which is administered by a Director of Medical Services, with headquarters in Aden. There are no organized public health services in the Protectorate. Medical facilities are supported mainly by the British authorities in Western Aden Protectorate and by the local A 743 rulers in Eastern Aden Protectorate. As of 1950, there were 4 hospitals, with an aggregate capacity of about 600 beds, in the Colony which served the local residents and accessible portions of the Protectorate. In addition, several government, mission or private dispensaries, 2 venereal disease treatment centers and a maternity and child A 743 welfare clinic were in operation. The Protectorate facilities included 2 small hospitals, a child welfare center and 15 dispensaries in Eastern Aden Protectorate: 18 dispensaries in Western Aden Protectorate.

H A 312 Water supplies are scarce throughout this region, except in portions of the western highlands. The water supply for the Colony is derived from boreholes and treated by chlorination. Supplies in the Protectorate are obtained from streams, springs, wells A H or rain-water cisterns. The methods of sew- 364 age disposal are primitive in the Colony, 944 as well as in the Protectorate. Limited sanitary controls over the production and the distribution of foodstuffs exist only in THE COLONY.

p. 252 (A)